

Rapid Ecological Assessment (REA) Survey Methodology:

#1. Fish Surveys

Coral Reef Ecosystem Program (CREP)

January 2016

Stationary Point Count (SPC) - Overview

The SPC is a method based on taking a "snapshot" of how many (and what kind, and what size of) fishes are present in a given area at *one* instance in time.

This is challenging because time is limited so we use a standardized approach to search, identify species and estimate their length, in a controlled step-by-step manner.

This allows for a more thorough survey and addresses issues relating to fish behavior and range on a reef or other habitats.

Stationary Point Count (SPC) - Overview

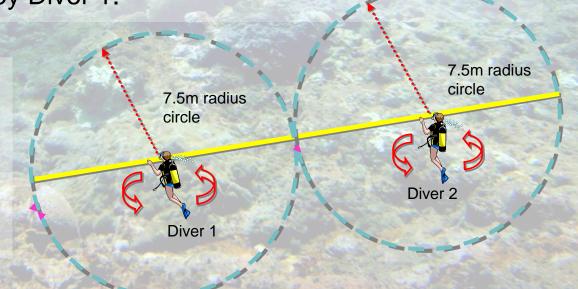
A single complete survey is conducted by 2 divers in adjacent, 7.5m radius cylinders and consists of the following:

- Fish survey: Fishes are counted and sized with the goal of capturing the biomass of all the fish in the cylinder during a "snapshot" in time;
- 2. Benthic habitat survey: Divers then estimate benthic cover, substrate height, and urchin density in their cylinders, and habitat type of the general area;

3. Digital benthic photos: At the end of the surveys, photos are taken along the transect line by Diver 1.

This presentation focuses only on fish surveys.

Benthic surveys and photo information are covered in the presentation "#3 Benthic Habitat Surveys."



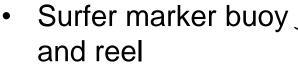
Stationary Point Count (SPC) - Overview

Here's what will be covered:

- Equipment
- Site selection
- Types of fish data
- Uses of fish data
- Data collection
 - Basics
 - Examples
 - Highly mobile species
 - Presence data
- Review
- Additional tips and rules

Equipment

Logistical



- GPS unit w/sites preloaded
- Map of sites
- Dive/Navigation sheet

Dive and Navigation Information

Tutuila - NW Primary 2015

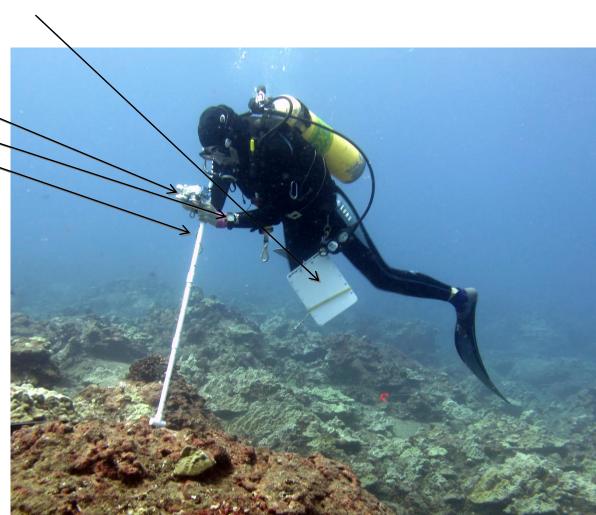


Equipment

Survey

- Underwater slate, and data sheet
- Camera
- Watch
- Meter stick \(\sqrt{} \)
- 30m transect reel





Site selection

Locating and assessing the sample site

- Navigate to predetermined site coordinates (GPS waypoints) in the designated depth strata (shallow: 0-6m, moderate: 6-18m, deep: 18-30m).
- Look for suitable habitat (should be ~ 50% hardbottom, i.e. not sand flat).
- Alternate sites. If primary site not suitable, make a note on the Dive Navigation Sheet and proceed to an alternate site.

Site selection

Suitable habitat





Unsuitable habitat

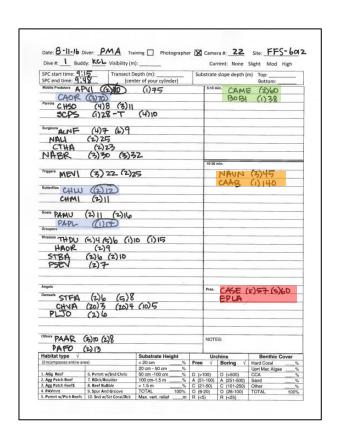




Types of fish data

You will identify, count, and size all of the fish in your cylinder, recording the data in slightly different ways. Because the methods we use to do this are consistent, the data can be filtered appropriately for analysis.

- Instantaneous (I)
- Non-instantaneous (N)
- 5-10 min (F)
- 10-30 min (T)
- Presence (P)

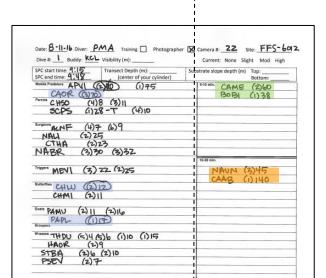


Types of fish data

LEFT SIDE:

Make the fish seen during the first 5 minutes your priority, especially if you're new.

- Instantaneous (I)
- Non-instantaneous (N)



CHVA (2)6 (5)8 CHVA (20)3 (20)4 (10)5 PLJO (2)6

" PAAR (3)10 (2)8

CASE (5) 57 (5) 60

RIGHT SIDE:

The fish seen after the first 5 minutes are important, but supplemental data.

- 5-10 min (F)

- 10-30 min (T)

- Presence (P)

P data especially is gathered opportunistically.

Uses of fish data

It's not a requirement to know HOW the different types of data are used, though it may be helpful.

It IS important that everyone collects the data the same way.

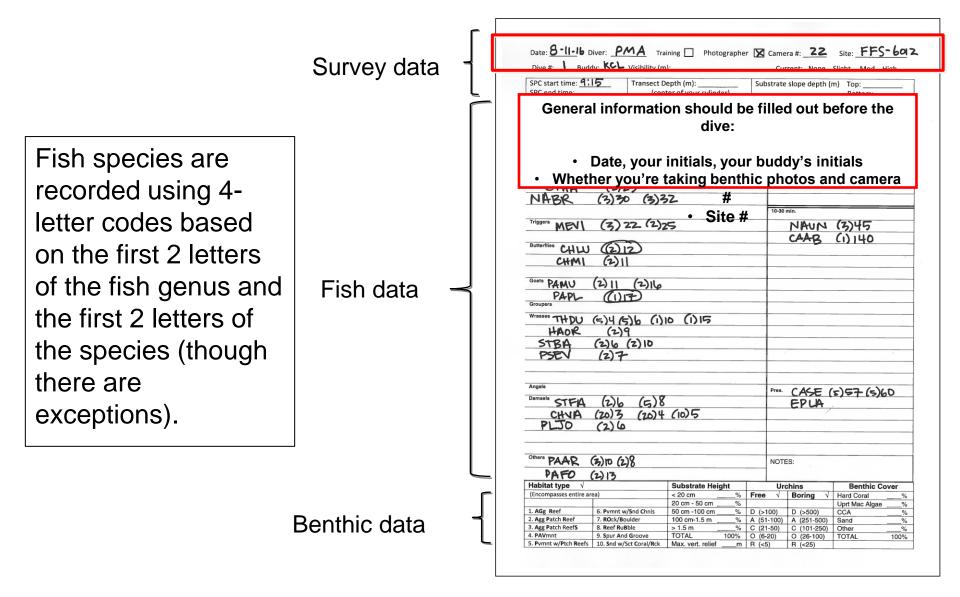
- Instantaneous (I)
 - Uses: Fish density per unit area, size structure
- Non-instantaneous (N)
 - Uses: Fish density, size structure

- 5-10 min (F)
 - Use: Fish density, size structure
- 10-30 min (T)
 - Use: Size structure
- Presence (P)
 - Uses: Size structure, species lists

For more information, see the "CREP Standard Operating Procedures (SOP) Manual under "Reference Materials" in the Survey Method Training materials.

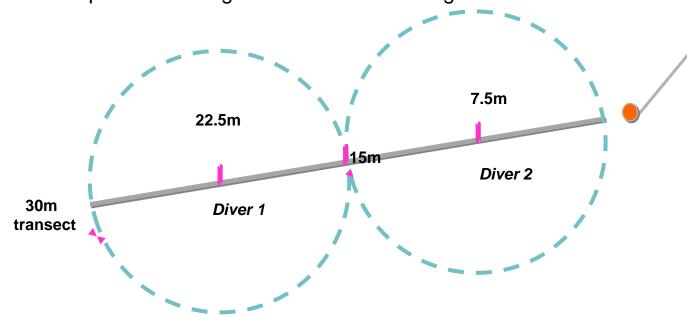
Data collection

Fish and habitat data sheet



Data collection - basics

- 1. Diver 2 sets the surface marker buoy; Diver 1 lays the transect along a single depth contour. The divers move to the center mark in their cylinder.
- 2. Divers give an "OK," record the time and set their watches, and begin the survey.
- 3. First 5 minutes Divers start a list of fish species observed, no counts or sizes
 - Exception: Highly mobile species unlikely to reappear
- 4. After 5 minutes Divers again give "OK," then go down species list, starting at top with Mobile Predators, counting & sizing individuals currently in their cylinder
 - If a species on the list is no longer present, the "remembered" size and count is written down and circled.
 - Brand new species entering are recorded on the right side of the data sheet.



buoy

	iver: PMA Tra		S					Slight Mod H	
SPC start time: \\				Sub			e depth (r		
SPC end time:	(cen	ter of your cylind	er)			·		Bottom:	
Mobile Predators					5-10 m	in.			
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SCKI									
SCPS	•								
CHS	٥								
Surgeons ALN	F								
CTSP	2			\neg					
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NALI									
					10-30 n	nin.			
Triggers MEN	× - 1								
14.014									
Butterflies ALL	. 4						_		_
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Goats PAMU									
PAIN	1								
Groupers				\neg					
Wrasses -151				-					
THOU				-	_				
HAOR									
COGA									
							-		
			-						
Angels				\neg	Pres.				
Damsels STFA					1100.				
PLJ)								
				T					
Others CAJA					NOTE	S:			
PAAR				-					
1 1 1 1 1 1 1		Cubet	la A		11	In Sec		Darritt- 0	
Habitat type √ (Encompasses entire an	92)	Substrate Hei < 20 cm	ght %	Free	Urc		s oring √	Benthic Co Hard Coral	ver%
rencompasses entire ar		20 cm - 50 cm	% %	riee	٧	ВС	ming V	Uprt Mac Algae	% %
L AGg Reef	6. Pvmnt w/Snd Chnls	50 cm -100 cm _		D (>1	00)	D	(>500)	CCA	%
2. Agg Patch Reef	7. ROck/Boulder	100 cm-1.5 m	%	A (51	-100)	Α	(251-500)	Sand	%
3. Agg Patch ReefS 4. PAVmnt	8. Reef RuBble 9. Spur And Groove	> 1.5 m	100%	C (21 O (6-			(101-250) (26-100)	Other	%
								TOTAL	100%

 First 5 minutes: Make list of species, no sizes or counts...

	Diver: PMA Tra						Slight Mod H	
SPC start time:	Transect C	Depth (m):		Sub		slope depth (n		
SPC end time:		ter of your c	ylinder)	500	Strate	stope deptit (i	Bottom:	
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SCP	4.5							
Surgeons A.A.		(2)18	24-T					
Surgeons ACN	F (6)10	(6)12						
CTS	R (2)4	(4)6 (2)10					
NAL	1 (1)24)							5
. , , ,					İ			
					10-30 r	nin.	***	
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Triggers MEN	21							
Butterflies CH1	UM							
CHO	R				Ì			
Goats DAM	19				 			
PAI								
Groupers	17							
Wrasses -151								
14700								
HAOR	•							
COGA								
			1					
Angels					Pres.			
Damsels Carry	۸				1100			
2141	<u>†</u>				<u> </u>			
PL	.0				<u> </u>			
Others CAJA	-				NOTE	S:		
PAA	0							
Habitat type √		Substrate	Height		Ure	hins	Benthic Co	ver
(Encompasses entire	area)	< 20 cm	neight %	Free		Boring √	Hard Coral	%
V.,		20 cm - 50	cm%				Uprt Mac Algae	%
1. AGg Reef	6. Pvmnt w/Snd Chnls	50 cm -100				D (>500)	CCA	%
Agg Patch Reef Agg Patch ReefS	7. ROck/Boulder 8. Reef RuBble	100 cm-1.5 > 1.5 m	m%		1-100)	A (251-500) C (101-250)	Sand	%
J. AKK PALCH REELS	o. Reel Rubble	> 1.5 M	%	10 (2	(UC-1	U (101-250)	Other	%
4. PAVmnt	9. Spur And Groove	TOTAL	100%	0 (6	001	O (26-100)	TOTAL	100%

- First 5 minutes: Make a list of species
- After 5 minutes: Starting at top, size and count fish by family.
 - This is **instantaneous** data.
- If a listed species on the list is not present during the sizing and counting stage give a best estimate from the original sighting and circle the data.
 - This is non-instantaneous data.

Dive # Bu	Diver: PN	Visibility (m):	_			Curi	ent: Non	e SI	ight Mod H	igh
SPC start time:		Transect D				Sub	strate	slope dept	h (m	Ton:	_
SPC end time:	1.136		ter of your		r)	-			(Bottom:	
Mobile Predators							5-10 m	n. B0	121	27	
								50	DI		
Parrots SCR	.1 2	0-T					\vdash				£
			10				-				\rightarrow
SCP		(2)14					├—				_
Surgeons A.A.			(2)18	24	<u>-T</u>		<u> </u>				
Surgeons ACN	1F	(6)10 (
CTS	R	(2)4	(4)6	(2)10)		1				
NAL	1 (1)	124)									
					- 1	-	10-30 n	nin.			
Triggers AACA	.1	(2) 20					1				
Triggers MEN	21	(2)20					_				
Butterflies CH1	UV	(2)11									
CHO	R	12									
Goats DAM	11 /4) 10 (7)12				-				
PAI		710	7/16				-				
Groupers	14	191				_	-				
	£111			-			_				
1400	(6)4	(5)6	(3)10	(1)1	4						
HAOR	. (3))4 (2))8 (3)	110							
COGA	·										
				,							
							Pres.				
Angels							Pres.				
	A						<u> </u>		7		
	4								/		
	4								100		
	4						-		100		
	<u>7</u>										
	<u> </u>										
Damsels STFI	7						NOTE				
Damsels STF) PLI Others CAJA							NOTE	S:			
Damsels STFI PLI Others CAJA PAA											
Others CAJA PAA Habitat type	R		Substra	ite Heig			Urc	hins		Benthic Co	
Damsels STFI PLI Others CAJA PAA	R		< 20 cm		%	Free	Urc			Hard Coral	
Others CASA PAA Habitat type (Encompasses entire	R area)	/Cod Chale	< 20 cm - 5	50 cm	% %		Urc	hins Boring		Hard Coral Uprt Mac Algae	
Others CATA PAA Habitat type (Encompasses entire	area) 6. Pvmnt w		< 20 cm - 5 50 cm - 1	50 cm	% %	D (>	Urc • √	Boring D (>500)		Hard Coral Uprt Mac Algae CCA	
PAA Habitat type √	R area)	ulder	< 20 cm - 5	50 cm	% %	D (>	Urc	hins Boring	00)	Hard Coral Uprt Mac Algae	over

- First 5 minutes: Make a list of species
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- If a listed species on the list is not present during the sizing and counting stage give a best estimate from the original sighting and circle the data.
 - This is non-instantaneous data.
- Continue systematically down your list, sizing and counting. If a new fish enters in this 5-10 minute period, write the sizes and counts on the upper right of your sheet.

Dive #: 2 But	ddy: KDG Visibility (m	n):			Cur	rent: None	Slight Mod H	igh
SPC start time: 1		Depth (m):	vlinder\	Sub	strate	slope depth (r	n) Top: Bottom:	
Mobile Predators	· Ti (cen	iter of your c	yiinder)		5-10 m			
Wobile Fredators	'\				3-10 11	in BOB	1 27	
			7					
Parrots SCR	U 30-T							_
SCP	5 (2)14	- 18						
CH	SD (3)12	(2)18	24-T					
Surgeons ACN		6)YZ						
CTS			2)10		-			
213		(470)	-/10					
- NAC	1 (1)24)				-			
					10-30 r	min.		
Triggers MEN	1 (2)20					CAME	= 40	
		2.						K
Butterflies CH1	11 (2) 11							1
CHO								
CHO	D				\vdash			
Goats N A AA	4 (1)	(-) 12			<u> </u>	\		
Goats DAM		(7)12				$\overline{}$		
Groupers PAI	N (14)				- 1	$\overline{}$		
	****		-					
Wrasses THDU	(6)4 (5)6	(3)10	<i>(</i> 1)14					
HAOR	. (3)4 (2	.)8 (3)	11					
COGA	(18)							
						_		
				-				_
Angels					Pres.			$\overline{}$
Damsels Carry	(2)/(2)	0 (1)			FIES.			
3141	4 (2)6 (2)	8 (1)	O					
PLI	0 (3)7	•						
Others CAJA	(2)5	4			NOTE	ES:		
PAA	e (2)7	(2)9						
Habitat type √		Substrate	Height		Ure	chins	Benthic Co	ver
(Encompasses entire	area)	< 20 cm	%	Free		Boring √	Hard Coral	%
		20 cm - 50					Uprt Mac Algae	%
	6. Pvmnt w/Snd Chnls	50 cm -100				D (>500)	CCA	9
	7 BOck/Boulder			I A [5]	i-100)	A (251-500)	i sand	9/
1. AGg Reef 2. Agg Patch Reef 3. Agg Patch ReefS	7. ROck/Boulder 8. Reef RuBble	100 cm-1.5 > 1.5 m	%	C (2		C (101-250)	Other	
1. AGg Reef					1-100)	A (251-500)	Sand	_

- First 5 minutes: Make a list of species
- After 5 minutes: Starting at top, size and count fish by family.
 - These is instantaneous data.
- If a listed species on the list is not present during the sizing and counting stage give a best estimate from the original sighting and circle the data.
 - This is non-instantaneous data.
- Continue systematically down your list, sizing and counting. If a new fish enters in this 5-10 minute period, write the sizes and counts on the upper right of your sheet.
- Between 10 minutes and the end of your survey (but not more than a total of 30 minutes) any new species that enter your cylinder are added on the right in the 10-30 min section.
- Once you size and count the last fish on the left side of your sheet, record this SPC end time before you begin your benthic estimations.

Data collection – highly mobile species

In the mentioned example, there were no "targeted" fish (mobile or rare fishes such as sharks, jacks, humphead wrasse, etc.) during the first 5 minutes.

Often, these types fish are seen in the first 5 minutes but don't return. You record them as non-instantaneous (circled), but instead of waiting to "remember" them, you can take note of the number and size of the fish during that first 5 minutes and circle it. If it doesn't return after the initial 5 minutes you have an accurate non-instantaneous count.

If the fish IS in your cylinder during the tallying period (after the initial 5 minutes) at the moment you've reached it on your data sheet, cross out your previous notes and enter the current size and numbers.

The next slides provide an example of these mobile species and what to do when they enter your cylinder during the first 5 minutes.

Examples of highly mobile species



Jacks



Sharks



Humphead wrasse



Barracuda



Milkfish



Emperors



Lyretail grouper



Green jobfish



Bumphead parrotfish

With experience, you may be able to expand this list to perhaps include other families, like some parrotfish or surgeonfish. For now, concentrate on just these.

Date: 8-15-16 D	iver: PMA Trai	ning Photograpl	er 🏏	Camei	ra #: <u>18</u>	_ Site	FFS	-6012
Dive #: 1 Budd	y: AEG Visibility (m):		Cur	rent: None	Slight	Med	High
SPC start time: 9:	Transect De	epth (m):	Sul	ostrate	slope depti	h (m) T	op:	
SPC end time:		er of your cylinder)					ottom:	
Mobile Predators	AB (2)50)	,		5-10 m	in.			
	The state of the s			-				
CAOR (3)	(2) 70			-				
				- 5				
CHSO			54					
SUPS				-				
Surgeons ACNE				1				
NAU							-	
				+				
CTHA				-				
NABR				_				
				10-30 r	nin.			
Triggers MENI								
MENI								
Butterflies CHW							0	
CHTR				1				
CHLN				_				
				-	-			
PAPO				-				
PAIN								
Groupers								
Wrasses COGA								
COFL					9			
THOU								
				1		-		-
BOBI		1		-				
MAGE				-				
	000	9.0		_				
Angels CEPO				Pres.				
Damsels STFA						1		
CHVIA						/		
PLJO								
PUJU				+				
					9			-2
Others DAA				-				
PAAR				NOTE	S:			
PAFO								
Habitat type √		Substrate Height		Urc	hins		Benthic C	over
(Encompasses entire an	ea)		Free	9 √	Boring		Coral	%
1.4C= P==/	6 B	20 cm - 50 cm9		100'	D / 500		Mac Algae	
1. AGg Reef 2. Agg Patch Reef	6. Pvmnt w/Snd Chnls 7. ROck/Boulder			100)	D (>500)	O) San		%
3. Agg Patch ReefS	8. Reef RuBble			21-50)	A (251-50 C (101-25			% %
4. PAVmnt	9. Spur And Groove	TOTAL 1009			O (26-100			100%
5 Pymnt w/Ptch Poefs	10 Snd w/Sct Coral/Pck		n B (-5)	D (~25)			

 First 5 minutes: Make species list. Size and circle only mobile/rare species.

Date: 815-16 Di	ver: PMA Trai	ning 🔲	Photograph	er 🗹	Camera	#: 18	Site: FFS	-6012
	: AEG Visibility (m)						Slight Mod H	
SPC start time: 9:1	5 Transect De	epth (m):		Sub	strate s	lope depth	(m) Top:	
SPC end time:	(cent	er of your	cylinder)	1			Bottom:	
Mobile Predators CA	AB (ATS)	(1)	120 ←		5-10 mir	1.		
	5 (2)70)	.,						
Parrots	12110				_			
CHSD					_			
5005								
Surgeons ACNE				_				
NAU								
CTHA								
NARR								
					10-30 mi	in.		
Triggers HENI			-		-			
MENI					_	_		
Butterflies CHW					-			
CHTR					_			
CHLN					-			
Goats PAPD								
PAIN								
Groupers					-			
Wrasses CO(-A				_				
COFL					_	-		
THOU								Ja.
BOBI		f				_		-
MAGE			,					
PIPOU								
Angels CEPO					Pres.			
Damsels STFA							*	
CHVA		-					/	
R50	-				-			
		-						
Others PAAR					NOTES	3:		
PAFO								
Habitat type √			te Height		Urcl		Benthic Co	
(Encompasses entire are	a)	< 20 cm	%		1	Boring \		%
1. AGg Reef	6. Pvmnt w/Snd Chnls	20 cm - 50 50 cm -10			100)	D (- 500)	Uprt Mac Algae	%
2. Agg Patch Reef	7. ROck/Boulder	100 cm-1				D (>500) A (251-500)	CCA Sand	%
3. Agg Patch ReefS	8. Reef RuBble	> 1.5 m	.5 111/8			C (101-250)		% %
4. PAVmnt	9. Spur And Groove	TOTAL	100%			O (26-100)	TOTAL	100%

- First 5 minutes: Make species list. Size and circle only mobile/rare species.
- After 5 minutes: starting at top in this case, CAAB (Carcharhinus amblyrhynchos – a shark) – look around to see if there are any in your cylinder. If there are, write the new count(s) and size(s) and cross out your circled information.
 - This data is instantaneous.
- Next on your list is CAOR (Carangoides orthogrammus – a jack). You look around your SPC cylinder and don't see any. Leave the entry as it is; it will be entered as "noninstantaneous" in the database.

Dive #: Buddy: AEC Visibility (m): Current: None Slight Mod of SPC start time: 9.15 Transect Depth (m): Substrate slope depth (m) Top: Bottom: SPC end time: SPC end time: Substrate slope depth (m) Top: Bottom: SPC end time: SPC en	Date: 8-15-16 Di	ver: PMA Tra	ining Photogra	pher 🏏	Camer	a #: 18	Site: FFS	-6017
SPC end time: (center of your cylinder) Bottom:								ligh
Mobile Predators CAAB	SPC start time: 9:1	5 Transect D	epth (m):	Sul	strate	slope depth (n	n) Top:	
CAOR (3) SS (2) PO Parrols CHGO (2) 18 (1) 26-T SUPSOND ACALE (6) 10 (6) 12 NHU (1) 25 (1) 30 CTHA (2) 24 NABL (4) 28 Triggers NENI (3) 16 (3) 20 MENI (1) 18 Butterfiles CHU (2) 13 CHTR (2) 6 (1) 12 CHUN (2) 13 CHTR (2) 6 (1) 12 CHUN (3) 16 (3) 20 MENI (1) 18 Butterfiles CHU (2) 13 CHTR (2) 6 (1) 12 CHUN (3) 16 (3) 20 MAGREE (4) 10 (1) 18 PAPO PAIN Groupers Wrasses CO(-A COFL THDU BOB1 MAGE Angels CEPO Damsels STEA CHUA PLJO Others PARR PAFO Habitat type Substrate Height Urchins Benthic C Encompasses entire area) 20 cm - 50 cm % Free Boring Hard Coral LAGg Reef 6. Pymnt w/Snd Chnis 50 cm - 100 cm % 50 cm 100 A.Agg Patch Reef 7. ROck/Boulder 100 cm - 15.5 m % A (51-100) A (251-500) Sand 3. Agg Patch Reef 7. ROck/Boulder 100 cm - 15.5 m % A (51-100) A (251-500) Sand 3. Agg Patch Reef 7. ROck/Boulder 100 cm - 15.5 m % A (51-100) A (251-500) Sand 3. Agg Patch Reef 7. ROck/Boulder 100 cm - 15.5 m % A (51-100) A (251-500) Sand 3. Agg Patch Reef 7. ROck/Boulder 100 cm - 15.5 m % A (51-100) A (251-500) CDTAL	SPC end time:	(cen	ter of your cylinder)				Bottom:	
CAOR (3)55 (2)70 Perrots CH4D (2)18 (1)26-T SLPS (3)14 (2)18 Surgeons ACNE (6)10 (6)12 NMU (1)25 (1)30 CTHA (2)24 NABL (4)28 Triggers MENI (3)16 (3)20 MENI (1)18 Butterflies CHW (2)13 CHTR (2)6 (1)12 CHLN Goats PAPO PAIN Groupers Wrasses COCA COFL THDU BOB1 MACE Angels CEPO Damaels STEA CHNA PATO The Substrate Height (2)0 (2)13 CHUA PATO The Substrate Height (2)0 (2)13 CHUA PATO NOTES: Benthic CCA Upri Mac Algae 1. AGg Reef (6, Pymnt w/Snd Chnis (2)0 cm - 50 cm - 100 cm - 50 cm - 100 cm - 50 cm - 50 cm - 100 cm - 50 cm	Mobile Predators CA	AR COME	(1) 120		5-10 mi	in.		
Surgeons ACNF (6) 10 (6) 12 NHU (1) 25 (1) 36 CTHA (2) 24 NABR (4) 28 Triggers MENI (3) 16 (3) 20 MENI (1) 18 Butterflies CHU (2) 13 CHTR (2) 6 (1) 12 CHLN Goats PAPD PAIN Groupers Wrasses CO(-IA COFL THDU BOBI MACF Angels CEPO Damsels STPA CHVA PATO Others PAAR PAFO Habitat type Others PARR PAFO Habitat type Substrate Height Urchins Benthic C (Encompasse entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96 [Cencompasses entire area) 20 cm - 50 cm - 96	CAOR (3)5		()			CAIG	(2) 90	
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Surgeons ACNE (6) 10 (6) 12	SUPS	(3)14 ((2)18					
NAME	Surgeons ACNE							
Triggers HEN (3) 16 (3) 20		(1)25 (1/30					
NABR			.,,,,,					
Triggers NENI (3) 16 (3) 20 MENI (1) 18 Butterflies CHW (2) 13 CHTR (2) 6 (1) 12 CHLN Goats PAPO PAIN Groupers					-			
Triggers NENI (3) 16 (3) 20 MEVI (1) 18 Butterflies CHW (2) 13 CHTR (2) 6 (1) 12 CHLN Goats PAPD PAIN Groupers Wrasses COGA COFL THDU BOBI MAGE Angels CEPO Damsels STPA CHNA PJOO Others PAAR PAFO Habitat type √ Substrate Height Urchins Benthic C (Encompasses entire area) < 20 cm % Free √ Boring √ Hard Coral (Encompasses entire area) 20 cm - 50 cm 90 1. AGg Reef 6. Pvmnt w/Snd Chnis 50 cm - 100 cm 50 cm 50 cm 100 cm 50 cm 50 cm 2. Agg Patch Reef 7. ROck/Roulder 100 cm - 1.5 m 9% A (51-100) A (251-500) Sand 3. Agg Patch Reef 8. Reef Rußble > 1.5 m 9% C (21-50) C (101-250) Other 4. PAVmnt 9. Spur And Groove TOTAL 100% O (6-20) C (26-100) TOTAL	MARK	((4)40)			_			
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Angels CEPO			75700					
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CHVA	MAGE				-			
CHVA	Angels CEPO				Pres.			
CHYA PARC PARC PARC PARO Habitat type √ Substrate Height	Demeels		- E					
NOTES: NOTES:					1	/		
NOTES: NOTES:					1			
Roll Restrict Re	FUJU				-	_		
Roll Restrict Re	- 1 N - 2				-			
Habitat type	Others PAAR				NOTE	:S:		
Habitat type					1			
CENCOMPASSES ENTIFE a F-3 C 20 cm			Substrate Height		Urc	hins	Benthic C	over
1. AGg Reef 6. Pvmnt w/Snd Chnls 50 cm -100 cm % D (>100) D (>500) CCA 2. Agg Patch Reef 7. ROck/Boulder 100 cm -1.5 m % A (51-100) A (251-500) Sand 3. Agg Patch ReefS 8. Reef RuBble > 1.5 m % C (21-50) C (101-250) Other 4. PAVmnt 9. Spur And Groove TOTAL 100% O (6-20) O (26-100) TOTAL		a)	< 20 cm				Hard Coral	%
2. Agg Patch Reef 7. ROck/Boulder 100 cm-1.5 m % A (51-100) A (251-500) Sand 3. Agg Patch ReefS 8. Reef RuBble > 1.5 m % C (21-50) C (101-250) Other 4. PAVmnt 9. Spur And Groove TOTAL 100% O (6-20) O (26-100) TOTAL							Uprt Mac Algae	%
3. Agg Patch ReefS 8. Reef RuBble > 1.5 m % C (21-50) C (101-250) Other 4. PAVmnt 9. Spur And Groove TOTAL 100% O (6-20) O (26-100) TOTAL								%
4. PAVmnt 9. Spur And Groove TOTAL 100% O (6-20) O (26-100) TOTAL								%
								100%
5. Pvmnt w/Ptch Reefs 10. Snd w/Sct Coral/Rck Max. vert. reliefm R (<5) R (<25)	5. Pvmnt w/Ptch Reefs	10. Snd w/Sct Coral/Rck	Max. vert. relief			R (<25)		

- First 5 minutes: Make species list. Size and circle only mobile/rare species.
- After 5 minutes: Starting at top in this case, CAAB (Carcharhinus amblyrhynchos – a shark) – look around to see if there are any in your cylinder. If there are, write in this new count(s) and size(s) and cross out your circled information.
 - This data is instantaneous.
- Next on your list is CAOR (Carangoides orthogrammus – a jack). You look around your SPC cylinder and don't see any. Leave the entry as it is; it will be entered as "noninstantaneous" in the database.
- Continue down your sheet as outlined in Example 1, sizing and counting fish, circling the ones you have to "remember" and adding brand new species on the right, either between 5-10 min or 10 -30 min.

Date: 8-15-16 Div	er: PMA Train	ning Photographe	r 7	Camer	ra #: <u>18</u>	Site: FFS-	6012
Dive #: Buddy	: AEG Visibility (m)	:		Cur	rent: None	Slight Mod H	igh
SPC start time: 9:1		epth (m): er of your cylinder)	Sub	strate	slope depth (n	n) Top: Bottom:	
	And the last of th	(1) 120	_	5-10 m	in.		
CAOR (3)5	Nicoland State of the last of	(1)100	_	\vdash	CAIL	(2) 90	
Parrots	5 (2) 70			-	CATO	(4) 70	
CHSD	(2)18 (1)2	26-T					
SUPS		E) 18					
Surgeons ACNE		12					
NAU		130		_			
	2)24						-
NARR	((4)28)	$\overline{}$				_	
141.00	(17-6)			10-30 n	nin.		_
Triggers HENI	(3)16 (3)20			APVI	(2)70	
MENI	(1)18				TROB		
Butterflies CHW	(2)1	3			1100	0,71,70	
CHTR)12	1				$\overline{}$
CHLN		i)u					
Gosts PAPD	(28)	-711			10-1		
PAIN	الع						
Groupers	11			\vdash	1		
Wrasses COGA	(2)4 (1)	13			$\overline{}$		-
COFL	27					-	-
	(2)4 (3)6	(2)10 (1)19					
THOU				\vdash		\	-
	1)22 (1) 2			\vdash			-
MAGE	(2)4	6) II	-	-	<u> </u>		
Angels CEPO	(4)9	(2)10		Pres.	APAR	(2)12	
Damsels STFA	6 11 .	(6) 8		-	ALAN	(6)16	
CHVA		304					$\overline{}$
PL50	(3)7 (2)8		_	-			\longrightarrow
		-					
Others PAAR	(3)8 (1)9		NOTE	S:		
PAFO	(1) 13						
Habitat type √		Substrate Height		Urc	hins	Benthic Co	ver
(Encompasses entire area	a)	< 20 cm%	Free	√	Boring √	Hard Coral	%
1 AC- Pool	6 D	20 cm - 50 cm%	D .	100'	D / 500	Uprt Mac Algae	%
	6. Pvmnt w/Snd Chnls 7. ROck/Boulder	50 cm -100 cm% 100 cm-1.5 m %	D (>	100) 1-100)	D (>500) A (251-500)	CCA Sand	%
	8. Reef RuBble	> 1.5 m%	C (2		C (101-250)	Other	%
	9. Spur And Groove	TOTAL 100%	0 (6		O (26-100)	TOTAL	100%
5. Pvmnt w/Ptch Reefs	10. Snd w/Sct Coral/Rck	Max. vert. reliefm	R (<	5)	R (<25)		

- First 5 minutes: Make species list. Size and circle only mobile/rare species.
- After 5 minutes: Starting at top in this case, CAAB (Carcharhinus amblyrhynchos – a shark) – look around to see if there are any in your cylinder. If there are, write in this new count(s) and size(s) and cross out your circled information.
 - This data is instantaneous.
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- Continue down your sheet as outlined in Example 1, sizing and counting fish, circling the ones you have to "remember" and adding brand new species on the right, either between 5-10 min or 10-30 min.
- Once you're done, write in the ending time.

Presence data

Presence data (P) is for fish seen outside of your cylinder and can be collected at any time during the survey, and if you're confident in the accuracy of your sizing, you can include size estimations.

You can also record just the presence of the species, with no counts or sizes (put "0" in the database).

Focus on targeted or rare species, such as targeted parrotfish, sharks, jacks, tuna, etc.





	Pres.	CASE	(s)57 (s)(D.
_				
_	NOTE	ES:		
	Uro	hins	Benthic Co	over
ee	_ √	Boring √	Hard Coral	15 %
			Uprt Mac Algae	2_%
(>1	100)	D (>500)	CCA	3 _%
(51	-100)	A (251-500)	Sand	5_%
	-50)	(101-250)	Other	75 %
16	20)	O (26-100)	TOTAL	100%
(0-				

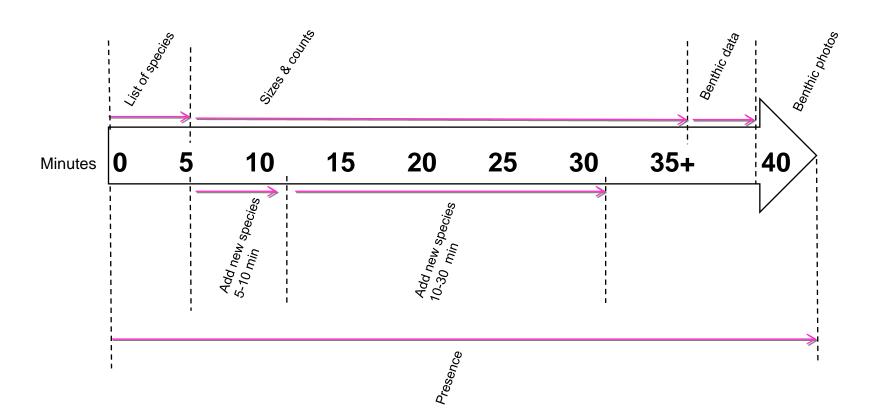




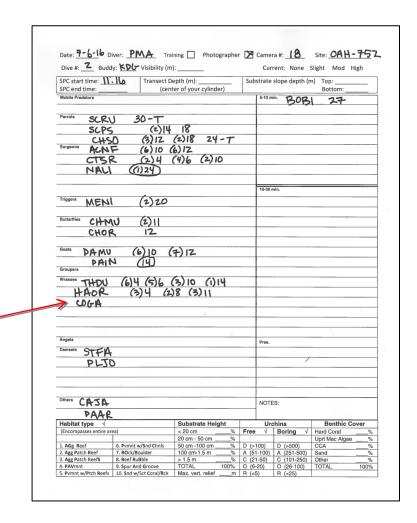


Review of method

- List of species First 5 minutes
- Sizes and counts after 5 minutes
 - Add new species on right (5-10 min and 10-30 min)
 - Circle species you have to "remember"
 - Fish seen outside the SPC cylinders can be added as Presence
- Collect benthic data; take photos (#4 Benthic Habitat Surveys)



- Once you've started the sizing and counting part, you won't ever go back and add additional sizes and counts to a previously counted species.
- For instance, if you've reached COGA on your data sheet and you then see 4 NALIs at size 28 and 2 SCRUs at size 22, you would not record them; they've already been counted.



Keep your focus up, and not down into the reef as much as possible to not miss roving fish, especially during the 5-minute listing of species.

- Later you can look more closely at the bottom for the smaller, more cryptic species.
 - But try not to "mow the lawn" to count every single little fish.
 - If the habitat is homogenous, it is acceptable to count a species in a subset of your cylinder, e.g. ¼ of the area, and extrapolate.



Keep your fins and other parts of your body off the bottom, not only to prevent damage to coral or other marine life, but also to prevent stirring up rocks or sand, which could attract some fishes and bias your counts.



What if you're not sure what species you're looking at, though you know the family or genus?

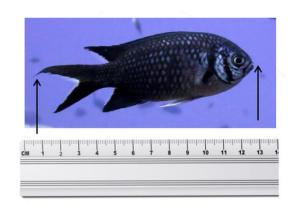
- Try to look for identifying features, but if you're not sure, don't guess.
- Take a picture or make a drawing, then look it up and /or discuss with other divers.
- If you know the genus but not the species, use the genus name with sp, e.g., Chlorurus sp (CLSP – NOT CHSP, that's Cheilodipterus sp) or Scarus sp (SCSP).
- If you know the family but not the genus, use the family, e.g., Scaridae. In the database these are listed under the first four letters of the common family name, so for Scaridae it would be PARR.

Terminal-phase parrotfish distinguished from initial- or juvenilephase parrots by writing a "T" next to the size



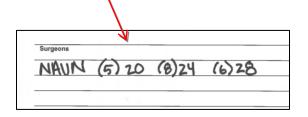
Sizing:

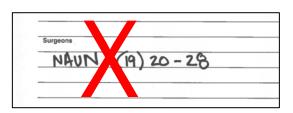
Use total length (to the nearest cm):
 tip of snout to tip of caudal fin



Counting:

 Each size category should have its own count, not a range.





See the next presentation "#2 – Fish Sizing and Counting" for more details